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Number 4



Illustrative Accounting Procedures For Federal Agencies

GUIDELINES FOR ACCOUNTING
FOR AUTOMATIC DATA
PROCESSING COSTS

UNITED STATES GENERAL
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FEDERAL GOVERNMENT ACCOUNTING SERIES

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C O N T E N T S

<u>Ch.</u>	<u>Sec.</u>		<u>Page</u>
		INTRODUCTION	i
1		IDENTIFYING AUTOMATIC DATA PROCESSING ACTIVITIES AND SIGNIFICANT COST ELEMENTS	1
	1	Basic principles	1
	2	Identifying ADP-related activities	1
	2A	General criteria	1
	2B	Specific exclusions	2
	3	Identifying significant cost elements	3
	4	Separating costs for software and equipment	4
2		CAPITALIZING EQUIPMENT AND SOFTWARE INVESTMENT COSTS	6
	1	Basic principles	6
	2	Guidelines for capitalizing equipment	6
	2A	Accumulating investment costs	6
	2B	Recording capitalized costs	7
	2C	Capitalization criteria	8
	3	Guidelines for capitalizing software	10
	3A	Accumulating investment costs	10
	3B	Recording capitalized costs	12
	3C	Capitalization criteria	13
3		ACCOUNTING FOR DEPRECIATION	16
	1	Basic principles	16
	2	Accounting for equipment depreciation	16
	2A	General guidelines	16
	2B	Criteria for determining useful life	16
	3	Accounting for software depreciation	17
	3A	General guidelines	17
	3B	Criteria for deciding useful life	17
4		ACCOUNTING FOR OPERATING COSTS	18
	1	Basic principles	18
	2	General requirements for accumulating costs	18
	3	Accumulating total operating costs	19
	4	Aggregating cost data for management control	19
	4A	Grouping costs by area of management responsibility	19
	4B	Grouping costs by work function	20
	5	Accumulating costs for each user application	23

Ch. Sec.

4	5A	Use of job order costing	23
	5B	Assigning costs from work functions to jobs	24
	5C	Use of predetermined or standard costing rates	24
	5D	Assigning fixed and variable costs at computer installations	25
	5E	Distributing maintenance costs for operating software and multipurpose software	25
5		REPORTING AND BILLING COSTS TO USERS	27
	1	Basic principles	27
	2	Preferred ways of stating charges	27
	2A	Reporting computer processing costs	27
	2B	Reporting software costs	28
	3	Frequency of reporting and billing	29
	4	Using different rates for period or priority of use	30

Figures

1	Cost elements that should generally be considered for potential reporting in ADP cost reports	5
2	Illustrated equipment property record	8
3	Illustrated record for obtaining depreciation costs by work function and its relation to the general ledger and property records	9
4	Illustrated software property record	12
5	Illustrated relationship between the general ledger and software property record	14
6	Examples of common work functions	21

INTRODUCTION

Title 2 of the U.S. General Accounting Office Policy and Procedures Manual For Guidance of Federal Agencies has long required agency accounting systems to record the cost of specific activities, operations, or products whenever such information is needed for management control or cost recovery purposes.

As discussed in our report "Accounting for Automatic Data Processing Costs Needs Improvement" (FGMSD-78-14, Feb. 7, 1978), the cost of automatic data processing (ADP) systems has become so significant and accounting practices have become so varied, that supplemental guidance on data processing costs is needed.

No accurate figures are available on Federal expenditures for data processing; the best estimate available is over \$10 billion annually. This makes it obvious that ADP costs are a sizable enough part of the Federal budget to merit special concern. Furthermore, each organization that operates a computer facility is often faced with a decision on changing its systems and facilities in one way or another. These changes are costly and they are often made without accurate cost data on the existing system or on the alternatives. Decisions made in this manner cannot be counted on to produce the most economical yet effective results.

Given the history of data processing growth, the general lack of ADP cost accounting is not too surprising. When computers first appeared, they were regarded somewhat like fast calculators, and like calculators they were treated as part of overhead, not as something requiring special cost accounting. Gradually, as computers became faster and more powerful, they began to serve a broader group of users. This trend has increased. In many agencies computer centers serve various program groups and provide administrative support such as processing personnel, payroll, and accounting data. Cost accounting frequently has not kept up with this growth and diversification.

To make the problem even more complicated, an agency's computer costs are often financed from several appropriations. For instance, it is not uncommon to find that civilian personnel costs are financed by one appropriation; overhead, such as rent and utilities, from another; and military personnel, who help operate the equipment or write the software programs, from another.

A related problem is that many agencies account for costs by program. Data processing is seen as a part of the cost of the program, not as a separate item for which costs should be recorded. Such agencies may have good cost data for programs but be unable, at present, to separate those costs that apply to ADP. We do not fault such agencies for developing their costs along program lines. This practice is most appropriate. We believe simply that ADP cost data is so significant that it too is needed and that cost records should be structured so that costs for both data processing and the agencies' programs can be identified.

In conclusion, we in GAO know Government accounting is complicated and we are always reluctant to add any additional requirements unless we believe the benefits clearly outweigh the costs. In this case, our studies have clearly shown that good cost data is rarely available for the costly decisions that must frequently be made on data processing activities. Further, incorrect decisions may be made by those the computer center serves simply because they too do not know the cost of the services they receive. Accordingly, we believe this type of cost accounting is needed for all computer operations and we urge all agency heads to see that it is established in every computer activity in their agencies.

We believe these guidelines should be implemented whenever any accounting system is redesigned. Thus, we expect to see a gradual implementation of these guidelines in our accounting systems reviews and approvals.

James B. Stearns

Comptroller General
of the United States

IDENTIFYING AUTOMATED

AND SIGNIFICANT

SECTION 1: BASIC PRINCIPLES

All significant elements of acquiring computers and data processing functions for in ways useful for reporting. This includes converting, and maintaining equipment and related a house data processing functions, computer time and maintenance data processing (ADP) consistently throughout a

SECTION 2: IDENTIFYING

There are three basic steps in identifying costs for automated systems:

1. Defining the tasks to be performed, acquisition and
2. Identifying and measuring the costs involved
3. Aggregating the costs

Discussion of steps 2 and 3 follows.

Many tasks performed are incidental and only a small portion of the total and use of ADP resources. Activities in accumulation of data are impractical, decisions are to be considered. The following criteria are of work stops and ADP work.

A. GENERAL CRITERIA

Activities that are those which

- o are necessary (computer processing)

CHAPTER 1

IDENTIFYING AUTOMATIC DATA PROCESSING ACTIVITIES AND SIGNIFICANT COST ELEMENTS

SECTION 1: BASIC PRINCIPLES

All significant elements of cost directly related to acquiring computers and associated assets and to performing data processing functions should be collected and accounted for in ways useful for management, budgeting, and external reporting. This includes the costs of (1) buying, developing, converting, and maintaining computer software, (2) acquiring equipment and related assets, (3) operating and managing in-house data processing facilities, and (4) purchasing computer time and maintenance services from others. Automatic data processing (ADP) related costs should be identified consistently throughout a department or agency.

SECTION 2: IDENTIFYING ADP-RELATED ACTIVITIES

There are three basic steps in identifying and accumulating costs for automated data processing:

1. Defining the types of activities associated with acquisition and operation of ADP resources.
2. Identifying and accumulating the material elements of costs involved in performing these activities.
3. Aggregating the costs in ways useful for management.

Discussion of steps 2 and 3 begins in section 3.

Many tasks performed in connection with data processing are incidental and only peripherally related to the acquisition and use of ADP resources. Because including all of these activities in accumulating data processing costs would be impractical, decisions must be made about which activities are to be considered related for costing purposes. The following criteria are offered for distinguishing where regular work stops and ADP work begins.

A. GENERAL CRITERIA

Activities that should be identified for costing purposes are those which

- o are necessary because a computer is being used (computer programming, for example) and

- o involve direct interaction with data processing equipment (such as keypunching and operating a computer or computer terminal).

B. SPECIFIC EXCLUSIONS

Consistent with these principles, the following activities and related costs should not be considered ADP costs.

1. Preliminary Studies--Preliminary studies, such as planning and analyses for deciding whether to invest in data processing equipment or a computer program, 1/ should generally be considered a normal management expense. The management expense itself may or may not be considered ADP-related. Once the decision is made to invest in an automated system, then cost-benefit, feasibility, and cost-comparison studies 2/--such as an A-76 study 3/--to determine the desirability, feasibility, and method of acquiring the needed asset or service, should be considered ADP related and subject to capitalization. (See ch. 3.)

2. Data Preparation--In general, efforts to prepare data for computer processing that do not directly involve the use of data processing machines and are incidental to the use of computers should not be considered ADP related. For example, manual preparation of forms that are to be keypunched or read by computer equipment should be considered a normal operating expense, not an ADP cost. Also, personnel costs for staff such as timekeepers and payroll clerks--who usually prepare documents for data processing and perform basic control functions--should not normally be considered ADP costs because similar work must be done whether or not the payroll system is automated.

1/General guidelines for evaluating decisions at this level are contained in the Office of Management and Budget Circular A-94: Discount Rates To Be Used in Evaluating Time-Distributed Costs and Benefits.

2/Cost comparison studies would consider the following investment choices: (1) developing versus buying software, (2) leasing versus buying the needed capital assets, and (3) using in-house or other Federal resources versus contracting for the service.

3/See Office of Management and Budget Circular No. A-76, "Policies for Acquiring Commercial or Industrial Products and Services for Government Use."

3. Report Distribution and Reproduction--Costs for physical--as opposed to electronic--distribution of ADP reports and secondary reproduction should generally not be considered ADP related. For example:

- o Costs for mailing computer-prepared invoices or checks should be considered normal operating costs.
- o Cost related to the secondary process of converting printed copy to microform should also be considered a program operating cost. However, costs for converting electronic computer output into hard-copy reports, microform (microfilm or microfiche), and visual images should be considered ADP costs.

4. Incidental Personnel Costs for Computer Programing-- Costs for people who write computer programs or operate a computer terminal, etc., as an incidental or minor part of their job and are not directly identified with the data processing organization or a project, should not be considered ADP related. However, where non-ADP personnel write computer programs as part of a project for developing or improving computer software and the project's cost meets an agency's criteria for capitalization their salaries and related indirect expenses should be treated as ADP costs.

SECTION 3: IDENTIFYING SIGNIFICANT COST ELEMENTS

All the significant elements of costs incurred in accomplishing ADP-related activities need to be identified and a means devised to record them. In addition to those incurred by a data processing organization, costs should be included for

- o any ADP work performed by other organizations;
- o items that are paid centrally, such as utilities, space rental, and central ADP office overhead;
- o unfunded costs, such as depreciation and certain employee benefits; and
- o items funded from appropriations or allotments other than those used to finance regular data processing operations, for such as: military salaries, equipment, construction, and telecommunications.

Organizational boundaries and differences in financing methods should not prevent reasonable compilation of all ADP-related expenses in cost accounts. Suitable memorandum

records are needed to track costs incurred by others and unfunded expenses that are not reflected in an agency's accounting system.

The cost elements that should generally be considered for potential reporting in ADP cost reports are shown in figure 1 on the following page.

SECTION 4: SEPARATING COSTS FOR SOFTWARE AND EQUIPMENT

In accounting for ADP costs it is important to separate software and equipment costs. This separation is needed for a number of reasons. One reason is that software and equipment have different life expectancies and work requirements. Further, the work of acquiring, maintaining, and operating them is commonly done by different people. Another reason is that a separate identification of costs is normally needed to properly assign costs to applications and to report and charge costs to users. It is therefore important for management control to keep distinct records of amounts spent on each.

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FIGURE 1

Personnel

Funded and unfunded costs of regular salaries, overtime, and fringe benefits for civilian and military persons who manage and perform ADP functions. This would include work such as development and upkeep of computer software, operation and management of in-house data processing centers and departments, data preparation, electronic output reproduction and distribution, equipment maintenance and contract management. It would also include persons performing ADP-related custodial services, security, and building maintenance.

Other personnel-related costs for training, travel, and recruiting.

Equipment

Nonrecurring expenditures for acquisition and recurring costs for rental, leasing, and depreciation (pro rata acquisition cost) of computers, associated online and offline ADP equipment, and special purpose ADP furniture.

Computer Software

Nonrecurring expenditures for acquisition, development, and conversion and recurring expenses for rental, leasing, and depreciation (pro rata acquisition cost) of all types of software--operating, multipurpose, and application.

Space Occupancy

Funded and unfunded costs for (1) rental, lease, and depreciation of buildings and general office furniture, (2) building maintenance, (3) regular telephone service and utilities, and (4) custodial services and security.

Supplies

Expenditures for noncapital office supplies and general- and special-purpose data processing materials. Special-purpose supplies are those prepared for one or a few applications. ADP tapes and disk packs may be considered either supplies or items of equipment. The latter choice is recommended where the inventory value is large enough to distort costs if expensed in a given accounting period.

Contracted Services

Expenditures and contracting expenses for:

- (1) Technical and consulting services for agency-operated computer facilities and equipment, including equipment maintenance; security and custodial services for computer facilities; and advice on the acquisition, selection, and use of computer facilities or software.
- (2) Computer system services and offline-equipment services such as for key data entry and report reproduction.
- (3) Analysis, design, programing, documentation, and testing for development, modification, conversion, and upkeep of computer software.
- (4) Data communications network services, associated telecommunications line charges, channel lease and rental, equipment rental and maintenance, and telecommunications system analysis and design.

Services From Other Units or Agencies

The costs of other governmental agencies or organizational elements for those services cited under "Contracted Services" above.

Intra-agency Services and Overhead

The costs of normal agency support services and overhead, either billed or allocated, and the costs of central ADP management, policy, and procurement services.

CHAPTER 2

CAPITALIZING EQUIPMENT AND

SOFTWARE INVESTMENT COSTS

SECTION 1: BASIC PRINCIPLES

Computers, related equipment, and software should be considered long-lived assets subject to capitalization and depreciation in accordance with GAO's accounting principles and standards for Federal agencies. The investment costs should be recorded in the general ledger and in property records

SECTION 2: GUIDELINES FOR CAPITALIZING EQUIPMENT

Computers and associated equipment owned or acquired by each agency should be capitalized in agency accounts. Accounting for depreciation is discussed in chapter 3.

A. ACCUMULATING INVESTMENT COSTS

The project cost method ^{1/} is recommended for accumulating equipment acquisition costs, particularly when personnel requirements for procurement and installation will be significant. Less formal methods of accounting are appropriate when only one or two items of equipment are acquired and the acquisition costs can be inexpensively determined with reasonable accuracy by cost-finding techniques.

The project cost method is recommended for the following reasons:

- o The job of selecting, acquiring, and installing equipment is often an ad hoc activity done by various people, often from different groups within an agency, devoting varying amounts of time.

^{1/}The project method serves both management and accounting objectives. From a management viewpoint, projects are carried out by a team (usually of individuals with diverse skills, e.g., programmers and accountants) for accomplishing a well-defined objective. The team is normally headed by one person responsible for the end results. From an accounting viewpoint, each project is an accounting entity (usually having a budget or estimated cost), for which costs are accumulated. Accumulated costs include all direct expenses and a fair share of indirect and overhead costs.

- o Costs are often funded from more than one appropriation.

Project costing provides an efficient means for accumulating costs incurred by different organizations and appropriations within an agency and for providing data in a useful form for management control.

Following installation, accumulated costs should be capitalized and recorded in the agency's accounting records.

B. RECORDING CAPITALIZED COSTS

Following is a recommended system of records and accounts for recording investment costs and determining depreciation costs in the detail needed.

1. General Ledger and Property Records

Acquisition costs for computers and associated equipment owned by each agency should be recorded in the general ledger asset account and appropriate property records. Property records may be kept in as much detail as management desires, but the capitalized amount must be recorded and reconciled with the general ledger account.

Where the investment in automated data processing equipment is substantial (e.g., if the agency owns a large computer), a separate account should be established for data processing assets so the costs can be readily identified.

2. Subsidiary Records

Subsidiary records should be structured so depreciation costs can be readily obtained for equipment located within each of the "work function accounts" for a data processing organization. (See ch. 4, sec. 4(B).) Property records could serve as such subsidiary records if designed to provide the necessary information. Minimal information to be included is illustrated in figure 2.

FIGURE 2

Illustrated Equipment Property Record

Item
Location
Work function
Date installed (month, year)
Estimated life
Actual life
Salvage value
Depreciation amount (optional)

Costs:

Acquisition
Improvements (date and amount)
Maintenance (annual expenditures) (optional)

A record summarizing depreciation costs by work function and its relation to the general ledger and to property records is shown in figure 3. The need to account for costs by work function is discussed in chapter 4.

C. CAPITALIZATION CRITERIA

An agency should follow its general policies in capitalizing data processing equipment. The following supplemental criteria are provided to promote consistent decisions among agencies.

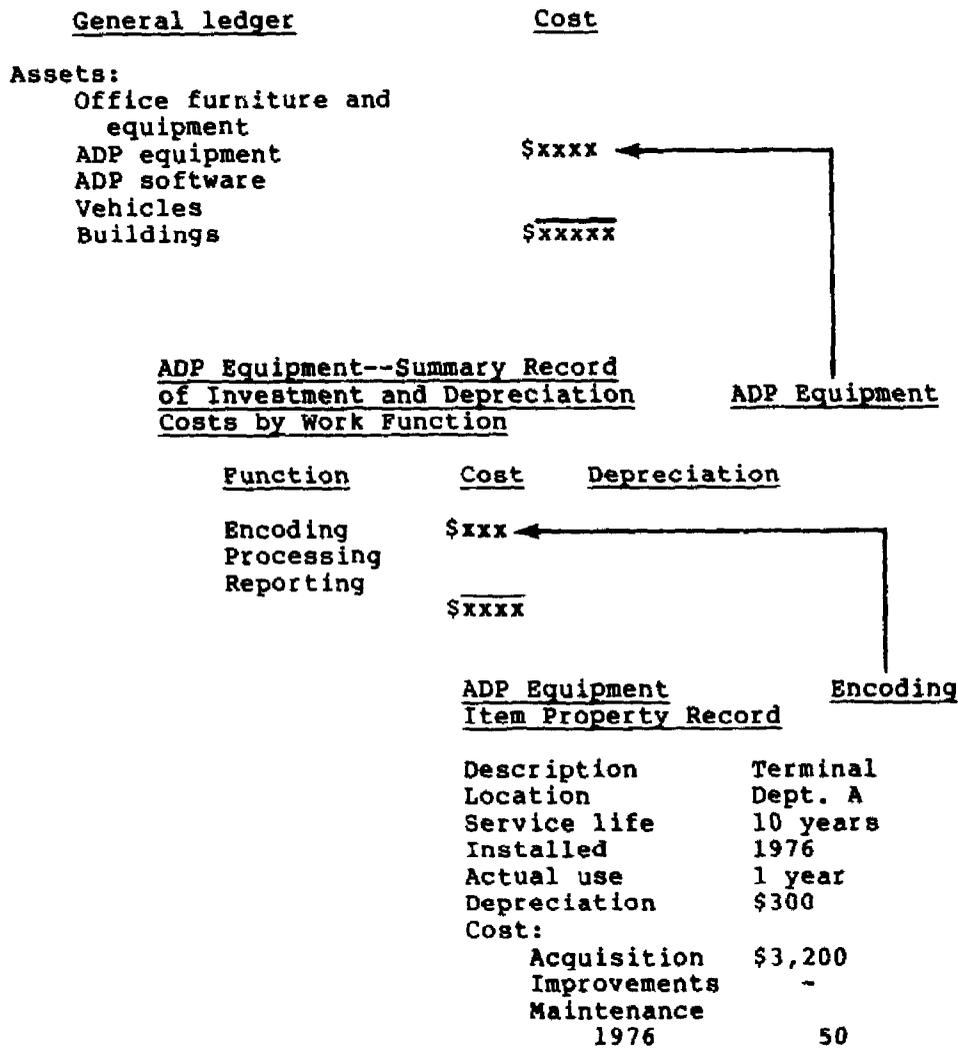
1. Equipment To Be Capitalized

The computer main frame, associated online and off-line equipment, associated data communications equipment, and special-purpose furniture used in data processing should be capitalized. Inclusion of operating software in the equipment asset account is also suggested.

Tapes and disk packs may be capitalized or considered current expenses. Where the additions to the inventory's dollar value is sufficiently high to distort costs if it is expensed in one accounting period, capitalization is recommended.

FIGURE 3

Illustrated Record for Obtaining
Depreciation Costs by Work Function and
Its Relation to the General
Ledger and Property Records



2. Cost Elements To Be Included
in the Acquisition Cost

Initial acquisition--The acquisition cost of equipment for capitalization should include the price of purchased data processing equipment or the estimated useful value of equipment obtained by other means (from surplus, by donation, etc.). As provided in title 2, subsection 12.5 of the GAO Manual, costs for installing the equipment, including transportation, building alterations and special air conditioning, and equipment modification and testing, should be included. Costs for predecision studies, and planning mission analyses would generally not be included. (See ch. 1, sec. 2(B).)

Improvements--Costs for improvements to capitalized equipment should also be capitalized. These costs would include amounts paid for overhaul or modification, after the equipment is in use, that prolongs or increases its useful life.

SECTION 3: GUIDELINES FOR CAPITALIZING SOFTWARE

Computer software--including operating, multipurpose, and application software--generally possesses three essential characteristics attributable to assets: long life, significant cost, and legal identity. Whether developed in-house or under contract, or purchased outright, software having these characteristics should be considered an asset subject to capitalization in agency accounts. Accounting for depreciation is discussed in chapter 3.

A. ACCUMULATING INVESTMENT COSTS

GAO's Accounting Principles and Standards for Guidance of Federal Agencies (GAO Manual title 2, subsec. 12.5) prescribes that:

"Management control over the cost of assets acquired by construction should be such as to assure that the cost of the work is kept within the authorized amounts and that accurate costs are recorded and transferred to the proper fixed property accounts when the work is finished."

Accounting for costs of software development must meet this requirement.

1. Recording Work-in-process Costs for Capitalization

Job order and project cost methods are recommended for accumulating costs of new software, both by purchase and development. Both methods provide useful information for management control. Job order costing is recommended where work is done within a normal hierarchical organization. Project costing is recommended where a single project manager is responsible for the results, such as for a new development effort (either in-house or by contract).

To facilitate separation of capital from maintenance expense when work is completed, a separate work-in-process subsidiary record should be established for each application or other software system. After a new or modified software system is tested and accepted for operations, total costs should be transferred from the work-in-process subsidiary record to the appropriate property account, as discussed in subsection B below. Costs for acquiring and developing new software systems and for modifying, converting, and improving existing systems which are to be capitalized should be accumulated in subsidiary records. Maintenance costs which are not to be capitalized should be recorded and then treated as operating expense. (See ch. 4.)

2. Reporting Work-in-Process Costs for Management Control

When an agency has a separate organization devoted to developing (and perhaps to maintaining) software, it should establish a cost center where all substantial software costs are collected. To provide data for management control, an agency should set up an appropriate structure of subsidiary accounts and records to group costs within such cost centers by area of management responsibility and by work functions, proceeding essentially as described in chapter 4.

To facilitate management control over resource requirements, a project budget including target completion dates should be established. The extent of detail can vary, but the format of cost estimates must be consistent with the method of accumulating costs so comparisons can be made with actual costs. As part of the control system, work-in-process costs should be periodically reported to managers of the development activity and the project manager responsible for planning, supervising, and funding. Similarly, the method of cost estimates and accounting should provide cost summaries

for the key phases of development for all management purposes. Management may want to have costs estimated beforehand for job orders as well.

B. RECORDING CAPITALIZED COSTS

The following system of records and accounts is recommended to appropriately record investment costs and charge depreciation.

1. General Ledger and Property Records

Acquisition costs incurred by an agency in obtaining software--through purchase, development, or donation--should be recorded in a general ledger asset account and in appropriate property records. Property records may be as detailed as management needs, but the capitalized amount must be recorded and reconciled with the general ledger account. Where the investment in software is substantial, a separate general ledger account should be established so that costs can be readily identified.

2. Subsidiary Records

Each software system should have a separate subsidiary property record showing the cumulative costs incurred in obtaining and maintaining it. The amounts should be classified according to (1) acquisition and development, (2) improvements, conversions, and modifications, and (3) routine upkeep (maintenance). Minimal information to be included in a software property record is shown below.

FIGURE 4

Illustrated Software Property Record

DESCRIPTION
Location
End user
Estimated life
Actual life
Date installed (month and year)
Salvage value
Depreciation amount (optional)
Costs:
Acquisition/development (initial costs)
Improvements (date, purpose, and cost incurred)
Upkeep (annual expenditures) (optional)

Such a record would provide a source of information for management decisions, as well as for depreciation costing.

An agency with many software systems may desire a subsidiary record summarizing the investment and depreciation cost for all of its software systems. Such a record and its relationship to the general ledger and property records is illustrated in figure 5.

C. CAPITALIZATION CRITERIA

The capitalization criteria established by an agency as part of its accounting policies should be applied to software. The following criteria are provided to promote consistent decisions among agencies.

1. Software To Be Capitalized

Two factors are to be considered in deciding whether nonrecurring investment-type costs for new software systems should be capitalized or be treated as a current operating expense: cost and useful life. Not every software system would warrant capitalization.

In general, the software (and hardware) of major ADP systems (as defined by OMB Circular A-109) and application or other software systems or subsystems whose acquisition cost is over \$100,000 (i.e., the cumulative acquisition cost of computer programs or software modules which have the same application purpose) should have their acquisition cost capitalized. Agency's are, of course, free to set the threshold for capitalization below GAO's dollar threshold.

Some software does not have an extended life. As a general criterion, we recommend that costs be capitalized when software systems are expected to be used repetitively for more than about 2 years. Criteria for deciding the useful life of software are discussed in chapter 3.

The amounts spent for developing and modifying computer programs that never become fully operational may be expensed.

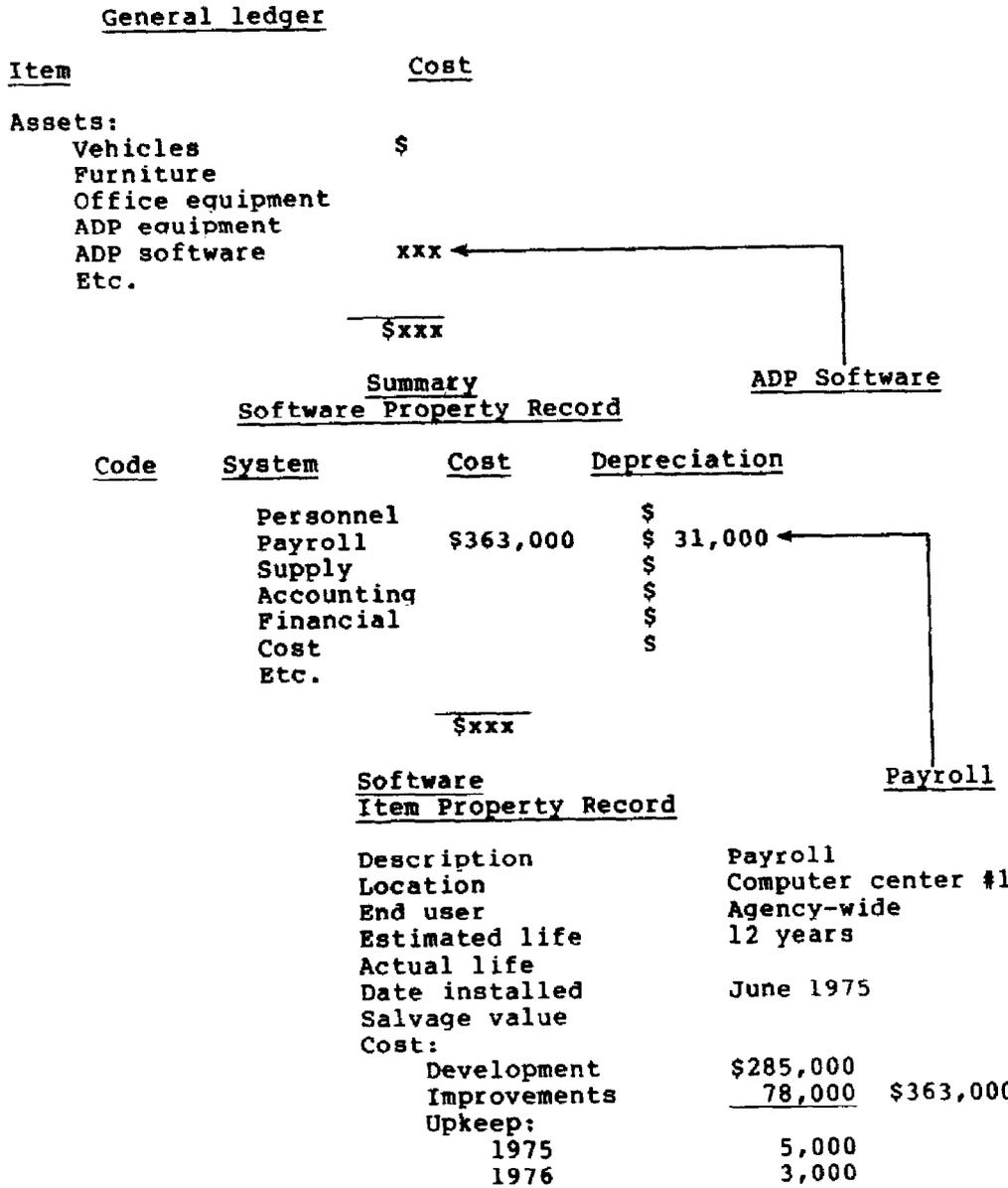
2. Cost Elements To Be Included in the Acquisition Costs

Acquisition and development costs of computer software designated for capitalization should include:

- The price of purchased software and the estimated useful value of software obtained by other means, including costs for preoperation modifications,

FIGURE 5

Illustrated Relationship Between the
General Ledger and Software Property Record



conversions, test Manual, title 2,

- Salaries and bene: compensation of c personnel for dev ing software obta would include exp programming, docum It would also inc computer operatin manual and other
- Computer operatin and parallel proc
- Direct and indire space, travel, su special training, during acquisitio

3. Improvements

Costs for improve life of a capitalized soft Management must decide whe will increase its useful l decisions, we recommend th are made to satisfy legisl convert software to differ ing more efficient. Unles usually be expensed if ch information retrieval (suc report).

conversions, testing, and documentation. (See GAO Manual, title 2, subsec. 12.5.)

- Salaries and benefits for agency staff and compensation of contractors and other Government personnel for developing new software and modifying software obtained through other means. This would include expenses for analysis, design, programming, documentation, testing, and conversion. It would also include expenses for preparing the computer operating instructions, user procedures manual and other documentation.
- Computer operating costs for testing, debugging, and parallel processing.
- Direct and indirect costs, such as office space, travel, supplies, communications, and special training, and normal overhead, incurred during acquisition and development.

3. Improvements

Costs for improvements that will increase the useful life of a capitalized software system should be capitalized. Management must decide whether work done on existing software will increase its useful life. As guidance for making such decisions, we recommend that costs be capitalized when changes are made to satisfy legislation or an Executive order, to convert software to different equipment, or to make processing more efficient. Unless they are substantial, costs may usually be expensed if changes are for corrections or one-time information retrieval (such as extracting data for a special report).

CHAPTER 3

ACCOUNTING FOR DEPRECIATION

SECTION 1: BASIC PRINCIPLES

GAO's Accounting Principles and Standards (GAO Manual, title 2, subsec. 12.5(h)) requires each agency to adopt procedures to account for depreciation of capital assets whenever a periodic determination of all resources consumed in performing services is needed. Accounting for depreciation of ADP assets--software, hardware, and facilities--is required to obtain full reimbursement of costs and is important for management users, and others who need to know the full cost of ADP services.

SECTION 2: ACCOUNTING FOR EQUIPMENT DEPRECIATION

A. GENERAL GUIDELINES

The investment cost of ADP equipment should be systematically amortized over the equipment's estimated useful life and assigned as a cost of operations. Depreciation should be reported as an unfunded operating cost.

In general, an agency should formally account for depreciation of ADP equipment when it owns or holds equity in a lease (rather than rents) for some or all of its ADP equipment. An agency with only ancillary (e.g., keypunch machines) or peripheral devices (e.g., remote terminals) should examine the merits of accounting for depreciation on an equipment class basis (e.g., one account for each general class of equipment).

In general, equipment depreciation should be treated as a direct cost when the investment is large and the amount of time the equipment is used on specific applications can be measured and recorded. Otherwise it should be treated as an indirect cost and appropriately assigned to benefiting applications along with other indirect and overhead costs.

B. CRITERIA FOR DETERMINING USEFUL LIFE

The expected life used by management in planning to obtain the equipment should normally be used as the useful life of the equipment for depreciation purposes. Past experience with similar equipment should be useful for both planning and estimating useful life.

SECTION 3: ACCOUNTING FOR SOFTWARE DEPRECIATION

A. GENERAL GUIDELINES

The method of accounting for depreciation of computer software should vary with the type of software and the nature of its use. When depreciation of computer software is reported it should be shown as an unfunded operating cost. In general, the investment cost should be amortized over a software system's useful life. Depreciation should be reported as follows.

1. Operating software

Depreciation should be reported as an operating cost along with equipment depreciation.

2. Multipurpose software

When multipurpose software benefits a limited number of applications, depreciation should be assigned and reported as a direct cost to the benefiting applications based on measured usage. Otherwise, multipurpose software depreciation should be treated the same as depreciation from operating software.

3. Application software

In general, depreciation for application systems and software whose costs have been capitalized should be taken and reported regularly over the life of the software. If the application supports several program functions, or organizational units, its depreciation should be prorated to each systematically on the basis of measured or estimated use. For convenience, such reporting may be done on an annual cycle and only to major organizational units.

B. CRITERIA FOR DECIDING USEFUL LIFE

The useful life of operating software should be based on the useful life of the computer with which it is used. The useful life of multipurpose software and applications software should be estimated on a case-by-case basis. If such software is designed to be relatively independent of the computer system on which it is used, then the useful life should be based on the planning estimates made by management in deciding to develop or acquire the software. However, if the software is structured to suit a particular computer system, its economically useful life for depreciation purposes should not exceed the useful life of that computer system.

CHAPTER 4

ACCOUNTING FOR OPERATING COSTS

SECTION 1: BASIC PRINCIPLES

Cost centers should be established to accumulate the operating costs incurred for computer processing and software maintenance. Within each cost center, costs should be aggregated by area of management responsibility and work function. Accumulated costs should also be assigned to the benefiting applications.

SECTION 2: GENERAL REQUIREMENTS
FOR ACCUMULATING COSTS

Data processing operations encompass two major activities: computer processing and software maintenance. 1/ Computer processing includes preparing and entering data, operating the computer, and preparing the computer output in usable form. Software maintenance involves keeping software systems up-to-date and operational. Each of these major activities usually consists of several work functions and subfunctions.

Most data processing functions can be performed in-house or under contract. The guidance here is directed to accounting for in-house operating costs. Costs for purchased ADP services should be identified and accumulated as ADP-related costs.

There are three general objectives in accounting for ADP operations costs. One is to arrive at the total cost of processing data with computers and other related resources. This can be achieved by using cost centers. (See sec. 3.) Second, for control purposes, management needs cost information on specific operations. This involves aggregating costs by area of management responsibility and by work functions. (See sec. 4.) A third objective is to know the costs incurred in processing data for each user application and in keeping software for that application up-to-date and operational. This can be achieved by using job-order (or in a few instances, process) cost methods. (See sec. 5.)

1/Software development is commonly considered an operating cost, but it should be treated as an investment and be accounted for as discussed in chapter 2.

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SECTION 3: ACCUMULATING TOTAL OPERATING COSTS

To accumulate total ADP operating costs, each data processing activity, organization, or installation involved in computer processing or software maintenance should be designated as a cost center. Additional accounts and subsidiary cost records should be established as needed to accumulate indirect and overhead costs for subsequent distribution to work functions and then to user applications. When one organization or group is responsible for both computer processing and software maintenance, costs for the two activities can be separated by having a system of accounts that collects costs by work functions and designating each activity as a separate work function.

Costs for work or services that are not funded by the cost center's operating budget should be recorded in memorandum accounts. (See ch. 1.)

SECTION 4: AGGREGATING COST DATA FOR MANAGEMENT CONTROL

A. GROUPING COSTS BY AREA OF MANAGEMENT RESPONSIBILITY

Accounting for and reporting of costs at organizational levels which coincide with assignments of management responsibility is a fundamental step in making individuals conscious of and responsible for the costs incurred within their areas of control. Unit heads are thereby provided information for planning and control, and costs can, in most cases, be related to individual decisions.

Management must decide what groups are to be considered responsibility centers and the proper set of costs to be aggregated. Management reports should clearly distinguish between controllable costs, for which the manager is held accountable, and those costs which, although relevant, can only be influenced indirectly.

Each management responsibility center may or may not correspond to a work function account, but a work function should normally be contained within a single area of management responsibility. For example, data encoding would not normally be encompassed within more than one manager's area of responsibility at any given installation or location.

B. GROUPING COSTS BY WORK FUNCTION

Segregating the costs of the different activities (work functions) involved in data processing is a prerequisite for effective management of ADP costs. A work function is a discrete work process for which costs can be accumulated and work measurements made. A group of similar machines whose use is measured by a common unit can be considered a work function.

Accumulating costs by work function requires management to identify costs that can be charged directly to specific work functions, and to establish a structure of subsidiary work function accounts to accumulate the direct costs and accept distribution of indirect and overhead costs.

1. Purpose of Accumulating Costs by Work Functions

Identifying costs by work functions provides information for management control and product costing. Product costing, assigns costs to user applications.

Accumulating costs by work functions permits an evaluation of the efficiency of performing specific operations and a comparison of the costs of functions that can be accomplished in more than one way or by more than one source. For example, data can be encoded by keypunching or by optical scanning and either in-house or under contract.

Accumulating costs by work functions also provides a means of isolating costs for similar activities and work processes which have a common unit for measuring resource consumption. Costs can then be distributed, from the work function accounts to the benefiting jobs or applications, on the basis of measured usage of the output or product of the work function.

2. Types of Work Function Accounts

Work functions can be classified as product functions and support functions. Product functions are those for which the output (and thus the accumulated costs) can be traced directly to the final product--a software application or its representative job order. Support functions are those upon which the product functions rely for certain services and skills. Support costs are analogous to indirect labor and indirect material in factory cost accounting--they are not traceable (or are not worth tracing) to the final product. Examples of support functions are administration and technical assistance. Costs for support functions are

distributed to product functions, or directly to applications if possible.

3. Number of Work Functions Needed

Work function accounts should be established both for computer processing and for software work. Software work includes (1) maintenance, which is accounted for as a normal operating cost and (2) development and modification, which are operating activities but whose costs are accumulated as investments. Typical work functions for software development and maintenance and for computer processing are shown in figure 6.

FIGURE 6

EXAMPLES OF COMMON WORK FUNCTIONS

Software Development and Maintenance Functions and Subfunctions

Analysis	Technical support:
Design	Documentation
Program coding	Library
Testing:	Standards
Program	Control
System	Training
Implementation/conversion	User liaison
	Administration

Computer Processing Operations Functions and Subfunctions

Data encoding:	Reporting:
Key entry	Collating/bursting
Optical scanning	Microfilm
Remote terminal	Technical support:
Computer operations:	Data control
Central processing unit	Data base management
Core memory	Performance management
Storage devices	Equipment maintenance
Channels	Training
Spooling functions	Administration
Teleprocessing:	
Job entry	
Message processing	

4. Costs To Be Included in Each Work Function

All direct, indirect, and overhead costs should be accumulated at the lowest support and product work function level. It may not, however, be practical to assign indirect and overhead costs to some small subfunctions. In such cases costs should be assigned to the parent function. Assigning indirect and overhead costs to discrete work functions makes managers aware of such costs and permits cost comparisons at the work function level. Distributing support function costs to product functions provides an efficient mechanism for distributing costs to user applications.

5. Distributing Indirect and Overhead Costs to Work Functions

Because indirect and overhead costs cannot be readily traced to specific work functions, some rational basis is needed for allocating them.

The most important criterion for selecting such a basis is relating the total cost to its most causal factor. Generally, this can be most easily accomplished by having a separate allocation base for each type of indirect and overhead cost.

Indirect costs--Direct measures of labor or equipment use will generally serve as a good basis for allocating indirect costs. This is because the two major costs in data processing are for equipment and labor.

Overhead costs--To simplify allocation of overhead costs, it is normally useful to classify overhead costs into three groups--general, space occupancy, and administrative. General overhead, or the cost of managing a Federal agency is usually only partially allocable since the existence and thus the management is usually mandated by law. However, direct management functions for ADP organizations, such as central ADP management, policy, and procurement offices, are allocable to ADP organizations established as cost centers and associated with the central office.

Generally, it is most appropriate to allocate these as follows:

- o Space occupancy overhead according to a uniform rate per square foot of space occupied.

- o Administrative overhead, such as payroll, personnel, supply, basic telephone service, and accounting, according to a uniform rate per employee.
- o General overhead according to a uniform rate per dollar of operating budget.

All overhead costs should usually be charged at a uniform rate throughout the year to balance out seasonal fluctuations.

SECTION 5: ACCUMULATING COSTS FOR EACH USER APPLICATION

A primary objective in accounting for the costs of data processing is to identify the software and computer processing costs attributable to individual user applications. Such cost information is needed in comparing and predicting costs and in reporting and billing costs to users. It can also alert managers to high cost and demand areas warranting attention. The importance to managers and users of knowing all the operating costs incurred in maintaining applications software and processing data for individual applications is hard to overstate. Accordingly, we recommend that costs be assigned to benefiting user applications even if costs are not formally billed to individual users.

A simple form of the job-order (or work-order) cost method, discussed below, should normally be used to assign costs to user applications. The process cost accounting method may be appropriate at a few computer installations where a single application is processed, or a small number of applications are processed, and the processing and equipment requirements for each are essentially the same. Because process costing is of rather limited use it will not be further discussed.

A. USE OF JOB ORDER COSTING

Under the job order system each software system

--is assigned a unique code (which we refer to as a job code) and

--has a separate work-in-process record (job order record) to accumulate costs.

Each time a software system is used for processing data, the associated computer processing costs accumulated in each work function account are assigned to and recorded in the uniquely identified job order record. The same procedure

is followed in recording the costs incurred in maintaining each software system. The maintenance costs for operating software and multipurpose software are subsequently distributed to user applications.

B. ASSIGNING COSTS FROM WORK FUNCTIONS TO JOBS

To assign costs from work functions to individual jobs or application programs, each work function (product function) must have a work measure and a costing rate. Normally a single rate is established for each work function (product and support) which includes all costs (direct, indirect, and overhead) attributable to that work function. However, separate rates for direct, indirect, and overhead costs may be used if management needs to identify these costs in its reports.

There are two types of work measures for determining the amount of costs attributable to a job or application. One is a measure of work performed, such as cards punched, lines printed, bytes transferred, or, more generally, transactions processed. The other is related to the physical consumption of resources in the work process, such as elapsed time, quantity consumed, and capacity used. Either base may be used, but quantity of work performed measures are preferable for evaluating efficiency and productivity.

If a measure of resource consumption is chosen it should be functionally related to the work performed. When such a measure is used, it may sometimes be useful for a work function to have more than one measure (e.g., staff-hours and machine-hours) and costing rate. This is particularly useful when a good cause-and-effect relationship cannot be achieved with one measure.

C. USE OF PREDETERMINED OR STANDARD COSTING RATES

To permit timely reporting by job, application, work function, and area of management responsibility, predetermined or standard costing rates are useful for most cost elements. Whenever predetermined or standard rates are employed, charges made with such rates should be periodically reconciled to total actual incurred costs. If law or regulation requires that charges be based on actual costs, this reconciliation process should be more formal and fully documented. Variances should generally be treated as overhead costs or credits. But when they are large or their

causes can be traced to variances should be redi applications on some rat

D. ASSIGNING FIXED AND COSTS AT COMPUTER I

In selecting a base costs to jobs, an account allocation rates for fix vary with frequency and on the basis of services assigned as a lump-sum p committed or devoted to

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E. DISTRIBUTING MAINTI OPERATING SOFTWARE

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2. Distributing M for Multipurpo

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causes can be traced to individual users or applications, variances should be redistributed to individual users or applications on some rational basis.

D. ASSIGNING FIXED AND VARIABLE COSTS AT COMPUTER INSTALLATIONS

In selecting a base for allocating computer processing costs to jobs, an accountant should consider using separate allocation rates for fixed and variable costs. Costs that vary with frequency and volume of service would be allocated on the basis of services provided. Fixed costs would be assigned as a lump-sum period cost based on the capacity committed or devoted to a user or user application.

Lumping fixed and variable costs into one rate often results in allocations that portray inaccurate cause-and-effect relationships. This is particularly true in computer facilities where fixed costs are substantial. Separate allocation of fixed and variable costs also reflects actual circumstances, since the basic capability and related fixed costs usually exist to satisfy the demands of specific users.

E. DISTRIBUTING MAINTENANCE COSTS FOR OPERATING SOFTWARE AND MULTIPURPOSE SOFTWARE

1. Distributing Maintenance Costs for Operating Software

Recurring costs for upkeep of operating software (along with costs for rent and depreciation) should be treated as operating costs of the computer with which the software is used. The cost must be distributed to the appropriate data processing work function (e.g., the function containing the central processing unit) and to benefiting applications based on measured use of the computer in processing. Normally the amount need not be itemized in cost reports or user bills.

2. Distributing Maintenance Costs for Multipurpose Software

Costs should be charged directly to applications, based on measured or anticipated use of multipurpose software in processing, when

- it is used in processing data only for selected applications and the costs are significant or

--managers or users need to monitor such costs.

Otherwise, the costs should be treated the same as costs for operating software.

CHAPTER 5

REPORTING AND BILLING COSTS TO USERS

SECTION 1: BASIC PRINCIPLES

Costs for data processing should normally be reported--whether reimbursed or not--to the users who receive the benefits as well as to the managers responsible for operations and for budgeting for the expenses. Agency administrators must decide, based on their situation and special requirements, whether costs should be billed to individual users.

SECTION 2: PREFERRED WAYS OF STATING CHARGES

Costs should be reported in a manner that will allow users to interpret the reports and bills for purposes of planning and control. Where feasible, costs should be stated in terms of the user's operations or transactions. Additionally, costs for user application software (and other important software) should be stated separately.

The amounts reported and billed to users must be based on actual costs. When predetermined costing rates are used, the amount reported must be periodically reconciled to actual costs. Any variances must be properly distributed, either to users or to general overhead. (See ch. 4, sec. 5.C.)

A. REPORTING COMPUTER PROCESSING COSTS

The costs of processing data for individual applications can be reported and billed to users in three ways. They can be stated in terms of the detailed measures used in assigning them to applications, restated in terms of a single unit, or restated in terms of user transactions.

1. Transaction Billing

The ideal approach is to state charges in terms of user transactions--the units of services or products provided to customers. Costs are reported in terms of the user's measure of activity (e.g., checks paid, inventory transactions, or personnel records maintained). Users can readily understand such charges and see how they respond to control--since charges will vary only with volume. This approach is particularly suited to charging for computer processing where the same applications are processed regularly, such as in cyclical accounting, personnel, and logistics applications.

2. Detailed Measures of Resources Used

Under other conditions, charges can be stated in terms of the same measures of resources used in assigning costs (from work functions to jobs). Charges are computed and stated in terms of a basic measure of capacity (e.g., staff-days, elapsed time, and execution time for the central processing unit) or a measure of component usage (e.g., lines printed or memory units reserved or used).

The advantage of this approach is that it provides a practical means of charging for highly variable unit operations, such as software programing, support testing, one-shot engineering applications, or applications with a highly variable workload. Its major disadvantage is that charges will vary with both efficiency and volume, frustrating users if they do not have much control over efficiency. Also, users may revise programs to take advantage of peculiarities in the methods of measuring resource use without increasing the efficiency of processing or reducing the cost of operating the computer.

3. Using a Single Unit

A less preferred alternative is to state charges in terms of a single, artificial unit as a composite measure of all the resources consumed. Commonly used units are CPU elapsed or execution time, and an artificial "computer accounting unit."

This method has essentially the same advantages as stating charges in terms of resources used. Furthermore, with charges combined into a single unit, users have less incentive or information for changing their programs to take advantage of peculiarities in the charging algorithm. This approach might be appropriate in computer facilities having highly variable unit operations, where users do their own programing and have a sophisticated knowledge of ADP operations. Its disadvantage is that artificial units have little real meaning for users.

B. REPORTING SOFTWARE COSTS

As indicated in chapters 3 and 4, the method of reporting computer software costs can vary depending on the type of software, the nature of its use, and management needs. As a general guide, we recommend that costs for use (depreciation and rent) and maintenance be reported as follows.

1. Operating Software

Costs should be reported with computer processing costs, as recommended on page 17. Normally, the amount need not be itemized in cost reports or user bills.

2. Multipurpose Software

Costs should be reported to users along with the costs for application programs when

--the multipurpose software is used in processing data for only selected applications and the costs are material or

--management or users need to know these costs.

Under these conditions the amounts should be itemized in reports and bills. Otherwise, the procedures for reporting operating software costs should be used.

3. User Applications

Recurring costs for depreciation, rent, and maintenance, along with assigned costs for multipurpose software, should be reported to users regularly, preferably at the end of an accounting period. If reported or billed along with the costs of computer processing, the amount should be shown separately. Whatever method is used, funded and unfunded costs should be itemized.

When an application benefits several users or a uniform system is used at numerous locations, management must decide if reporting costs to users serves a useful purpose and then choose a method of reporting costs.

SECTION 3: FREQUENCY OF REPORTING AND BILLING

Management must also set the method and frequency of reporting and billing assigned costs to users. The frequency of billings could coincide with the accounting cycle. Individual users may be notified on a more frequent basis by memorandum reports or bills--usually as processing of jobs or applications is completed.

SECTION 4: USING DIFFERENT RATES FOR PERIOD
OR PRIORITY OF USE

Contrary to popular belief, two or more rates may be desirable, warranted, and appropriate to reflect the cost of computer operations more accurately. For example, during certain peak use portions of the day or week, or for the provision of different priority or sets of services provided, a higher rate may be established. Lower rates would be established for slack periods, periods of limited provision of services, or for slower demands for response (jobs which can be scheduled more flexibly). A priority system may also be employed--with or without different rates--to give management more control over scheduling usage.

When different rates are used, the higher rate should reflect the additional cost (both investment and operating) incurred to have enough equipment, personnel, and software to provide for the peak period, faster, or additional services. The lower rate should reflect actual depreciation and operating costs of the capacity, response, and services provided for the period for which it applies. Computations of higher and lower rates should be provided to users or shown on billings so that users will know the difference and the actual cost of providing the services.

High and low rates should be applied to the total amount of costs assigned for a computer system and not to charges for individual components that may be overloaded or underused. Equipment should be tailored to requirements not vice versa.